



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/737,204	12/15/2003	Muge M. Bakircioglu	2003P12087US	5732

7590 01/11/2006

Siemens Corporation  
Intellectual Property Department  
170 Wood Avenue South  
Iselin, NJ 08830

EXAMINER
----------

JAWORSKI, FRANCIS J

ART UNIT	PAPER NUMBER
----------	--------------

3737

DATE MAILED: 01/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/737,204

Applicant(s)

BAKIRCIOGLU ET AL.

Examiner

Jaworski Francis J.

Art Unit

3737

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 October 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 - 45 is/are pending in the application.
- 4a) Of the above claim(s) 42-45 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 26-29 is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,8,9,11,13-25,30-32 and 35-41 is/are rejected.
- 7) ☒ Claim(s) 3,6,7,10,12,33 and 34 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 12-15-03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

The disclosure is objected to because of the following informalities: Para [0002] case status updates are needed.

Appropriate correction is required.

Claims 1 – 41 are present for examination in this case; claims 42 – 45 stand withdrawn pursuant to the election without traverse filed on October 25, 2005.

### ***Claim Objections***

Claim 14 is objected to because of the following informalities: The attribution found at the end of the claim before claim 15 should be deleted as extraneous..

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 35 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear if the 'adaptively updating' pertains to the mentioned parameters or to some other process.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Poehler et al (US5923278) or Cline et al (US6891370), in either case further in view of Chambers et al, or alternatively as obvious over Chambers et al (US2004/0122325) alone.

In the case of Poehler et al a multi-dimensional phase unwrapping technique is practiced to improve topographic resolution during coherent microwave radar imaging of displacements in altitude based typically upon Doppler-velocity-based signature information from aircraft or satellite (see col. 1 lines 54 – 57). Image display in color was globally well-known per Chambers et al para [0147] hence a color satellite terrain map for example would have been well-known.

In the case of Cline et al, an alternative multi-dimensional phase unwrapping technique derived also from SAR radar is practiced in the medical imaging environment

Art Unit: 3737

with suggestion to use same in Doppler optical tomography of bloodflow, see col. 1 lines 12 – 22 and col. 8 lines 58 – 63. Again, colorization of medical displays to enhance information portrayal was well-known, evidenced per Chambers et al.

In the case of Chambers et al itself, multi-dimensional phase unwrapping was known (see Figs. 8C and 8D) and in association with medical ultrasound imaging (see paras. 5 – 7) and adaptable to Doppler elastography of displacement (see para [0145]). That is, in alternation to static tissue stress-strain imaging using ultrasound, a dynamic pressure may be applied at lower frequency to 'jiggle' the tissue and its Doppler ultrasound response can indicate abnormalities in hardness or resilience such as is found in tumor masses.

In all cases the inventors would argue that the phase-unwrap processing is a form of automatic optimization by the processor of the multi-dimensional image being produced.

[Alternately stated, these rejections are predatory respectively upon the lack of limitation to a medical arts application (Poehler et al), upon the lack of limitation to ultrasound application (Cline et al), and upon a lack of limitation to Doppler bloodflow application within ultrasound (Chambers et al) because 'Doppler' is not necessarily medical Doppler which in turn does not necessarily associate with bloodflow and/or with ultrasound while having association with multi-dimensional phase unwrapping and multi-dimensional imaging.]

Art Unit: 3737

Claims 1 –2,4-5, 8- 9, 11, 13, 23 – 24, 30-32, 35-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiki (US20030125624) alone or further in view of Freiburger et al (US6364838) or Suorsa et al (US5363849), alone or further in view of Cline et al and Glass (US6011625), further in view of Goh et al (US5419328)..

[A summary statement below serves to clarify the rejection format.]

Shiki is directed to a processor-based three-dimensional Doppler color bloodflow imaging method and system in which corrected Doppler velocity measurements serve to facilitate enhanced imaging such as pulsatility parameterizations including thresholding and heartbeat synchronization. In pursuit of this, anti-aliasing corrections are practiced in order to prevent the velocity vector from aliasing, see paras [0127] – [0130], and this is argued to be tantamount to an unwrapping of phase for the multi-dimensional data and its imaging representation. In the alternative, it would have been obvious in view of Freiburger et al, where bloodflow is concerned, to use a time domain cross-correlation process 56, 58 in conjunction with the conventional FFT-derived bloodflow spectra to select the correct (unaliased) spectrum, step 58 and col. 5 lines 8 – 24, and therefore in effect one would be using the patterns within a frame during cross correlation to phase unwrap or unalias the velocity data. In the alternative, it would have been obvious in view of Suorsa et al, where Doppler tissue movement is concerned, to phase unwrap tissue movement to unalias the data (see col. 3 lines 15 – 63 and col. 5 lines 51 – 60). In the alternative still, under a narrower definition of phase unwrapping as pertaining to locating regions of phase wrap within a two-or three-dimensional image while assembled as a frame and correcting for same, it would have been obvious in view of

Art Unit: 3737

Cline et al col.1 lines 16 – 22 and col. 8 bottom and Glass col. 1 lines 27 –33 to practice same in an ultrasound imaging context since the extension of this technique to three-dimensions was known to be applicable to ultrasound imaging in the case of Cline et al and contemplated from an early inception of phase unwrapping algorithms as taught in Glass. Additionally, Goh et al in col. 7 line 57 – col. 9 line 58 contemplated phase unwrapping as an interframe operation (col. 8 lines 29 – 37 specifically) for cardiovascular motion study since this allowed for adapting viewing for specific intracardiac cycle events centering on systole or diastole.

[ Alternately stated, when the assumption is made for arguments' sake that the claims pertain to ultrasound (color) Doppler imaging to which secondary features such as adaptive velocity scaling, flow image thresholding, depth-dependent frequency selection and systolic governance of frequency selection are best associable, then an argument may divide as to whether or not 'multi-dimensional phase unwrapping' pertains to a broader definition where any multi-dimensionally practiced anti-aliasing process of the past which unwraps the phase vector of the ultrasound Doppler data from the aliased state suffices to meet the term (Shiki et al, in view of Freiburger et al (bloodflow Doppler) or in view of Surosa et al (tissue Doppler)) or whether the terminology pertains to a narrower definition of algorithmic processes practiced on image frames or volume portions (same but further in view of Cline et al and Glass mentioned therein, where such a narrow definition is set forth (Cline et al – col1 lines 49-59;Glass – col. 2 lines 37-48), further in view of Goh et al as a motivating suggestion to incorporate same into cardiologic motion study. ]

Art Unit: 3737

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Mo et al (US6296612) since whereas the former are silent as to clutter filter threshold setting it would have been obvious in view of the latter to set clutter filter threshold based upon valid input data in order to e.g. enact an FFT process such as in Freiburger with a proper baseline..

Claims 14 – 22 and 25 are rejected under 35 U.S.C. 103 (a) as obvious based upon Mo et al in view of Guracar. Mo et al teaches that the practice of color spectral Doppler (ultrasound) imaging may include the determination of the clutter threshold as a function of the power or energy associated with the filter and including a persistence feedback option. In the alternative, it would have been obvious in view of Guracar 50 to effect a persistence option by feedback adjustment of filter output energy.

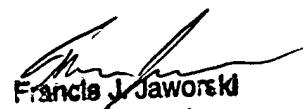
***Allowable Subject Matter***

Claims 3, 6 – 7, 10, 12, 33-34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 26 – 29 are allowed.

Patch et al (US6703835) is directed to phase difference imaging with phase unwrap capability.

Any inquiry concerning this communication should be directed to Jaworski Francis J. at telephone number 571-272-4738.

  
Francis J. Jaworski  
Primary Examiner